**Non-drug treatment of hypertension**

E Schultz B.Sc., MB. BCh., DTM & H, DPH. 1989 edited 2006.

---

*Summary*

A personal non-drug programme was effectively used in an urban clinic to risk-manage hypertension among African blacks in South Africa. The programme was well accepted and compliance was good. The components and structure of the programme are discussed. The view that hypertensives are not experimental subjects but real people who eat and live in a real world, motivated a scientific license to include in the programme components which had not all been individually proven in random double-blind controlled trials. The use of hypotensive drugs is neither a safe nor a feasible long-term personal or community strategy. Logistics and professional ethics underpin the need to include in any hypertension management programme comprehensive non-drug measures to prevent and reduce environmental risk factors.

---

*Introduction*

At the Hypertension and Diabetic Clinic [HTDMC], an out-patient facility in a state-funded general hospital in Johannesburg, South Africa a model for the risk-management of hypertension among African blacks[•] in which a non-drug programme was a critical and integrated component was developed and continuously tested between 1977 and 1986.

*Patients and staff*

At the time that the programme was operating only black people were allowed to attend the hospital situated in a densely populated white residential and business district. Except for the senior matrons the nursing staff were all Africans. The majority of the doctors were white.

The HTDMC reflected this demographic distribution. As the patient population grew the staff complement increased from 1 doctor, 2 nurses and several, mostly white, lay volunteers who assisted in history-taking, dietary and social counselling, yoga, remedial exercises and clinic administration to 2 general practitioners, several part-time consultant physicians, 5 in-service trained registered nurses and staff-nurses acting as primary care providers, a dedicated staff-nurse in-service trained as a patient educator, 2 assistant nurses, 2 clerks, 1 general helper, 2 part-time volunteer pharmacists and a variable number of lay volunteers.

---

• The use of racial terms reflects the contemporary reality and not the author's preference.

A deliberate decision was taken when the HTDMC was established to restrict the patient population to African blacks, that is, excluding people of mixed race or Asian origin. This facilitated a culturally sensitive relationship between the patients and the nurses. There was continuity of care at every level. While there was some movement among the staff the core members remained in the HTDMC until in 1986 some were removed on political grounds. The ethos in the HTDMC then changed.

*The structure of the HTDMC's non-drug programme*

All patients were strongly encouraged to commit themselves to the HTDMC's non-drug programme. It was discussed in the waiting area and reinforced on a one-to-one basis by all attendants at each visit. Audio-visual aids were not popular. Two clinic-made vernacular audio-tapes were sometimes used when no group discussion facilitator was present. A slide and tape programme - there was only one, on vegetable gardens - made especially for the HTDMC was not often used.

The internal and the inter-attendant consistency of the programme and the personal commitment and enthusiasm of the staff were important components of the programme. The staff attitude was predicated on participation in policy decisions and on a conviction that the non-drug programme was safe, feasible, acceptable, efficacious and effective.

*The components of the HTDMC's non-drug programme*

The non-drug risk management programme was comprehensive and attempted to address all the known and suspected risk factors for hypertension, hypertensive cardiomyopathy, hypertensive microvascular retinal, renal and cerebral disease and atherosclerotic cerebral and cardiac disease.

We considered that our responsibility was not limited to our patients but extended to their families and indirectly to the communities in which they lived and worked. The patients were asked to bring family members to the clinic for blood pressure measuring to encourage them also to follow the HTDMC's non-drug programme.

The programme was limited to personal measures but solidarity with the patients in their struggle for greater control over their lives was implicit and occasionally overt - a politically naive gesture which may have cost us dear. The recommended measures in the HTDMC's programme are cross-tabulated with risk factors for hypertension and its complications in table 1.

Although the prevalence of coronary heart disease in African black people in South Africa was low it was assumed that the rate would increase with cumulative changes in consumerist eating and living patterns and continued exposure to stressful socio-economic and political circumstances. Such an increase occurred among American Blacks and is now also noted among South Africans of mixed race.[1] It was considered expedient to attempt to prevent or at the least postpone this development in the HTDMC's patients.

The programme was informed by a social anthropological and epidemiological perspective. Whenever I became aware of a possible risk factor which was scientifically motivated and biologically rational, it was included in the programme. It was possible to do so because the patients and the nurses were easily persuaded by the evidence and because changes to the programme had seldom to be made. For example, initially patients were encouraged to eat whole grains and legumes because of their high potassium/sodium ratio. In time, their high poly-unsaturated fat, roughage and magnesium content and the fact that they were integral to a traditional dietary practice associated with a low prevalence of hypertension and related diseases, were added as reasons for recommending them.

A restrictive methodology subsumed in the doctrine of specific etiology [2] was often demanded of research into the putative determinants of hypertension.[3,4] However, hypertensives eat food, not individual nutrients nor the Kempner rice and fruit diet. Their dietary habits are related to other personal and social characteristics which affect blood pressure such as inheritance, age, gender, race, habitus, personality type; income, social class, occupation [type, presence, whether paid or unpaid, extent of control and number of concurrent jobs eg. housewife, mother, machinist, shop-steward], downward occupational and social mobility, education, place and type of accommodation, migrancy, institutionalised male dominance and racism as well as alcohol and tobacco abuse, level of physical activity and psycho-social and political stress. These variables should be viewed not only as independent personal characteristics but also as reflections of societal patterns. It is suggested[2] that "we [should] examine these correlations and categories simultaneously in order to identify the broad social and physical context in which hypertension occurs." These considerations apply equally to non-drug hypotensive measures, which can be viewed as the inverse of the etiological, or risk factors. Their reversal or removal could re-establish or approximate the status quo ante, normotension.

*Non-drug measures are efficacious and effective*

There is enough evidence [3-9] to satisfy most pedants that the components of the HTDMC's non-drug programme are either independently or colinearly efficacious in lowering blood pressure levels and in reducing the incidence and severity of the complications of hypertension as well as the risk of premature death.

Treatment must however not only be efficacious [it works in an ideal or test situation] but also effective [it works in real life]. Treatment must be safe and if long-term should tend towards restoring biological normality. [10] In the short-term treatment should improve not only measurable clinical variables but also the subject's sense of well-being. Treatment must be culturally and personally acceptable, economically and logistically feasible and in chronic conditions it should not undermine the subject's quality of life or independence.

*Compliance with the HTDMC's programme*

Compliance with expected attendance for treatment and adherence to the prescription is critical to effective and successful disease management strategies.

The setting and structure of a medical-care facility and all aspects of the personality and person of the care provider significantly affect compliance. Blaming the patient [victim-bashing] or an aspect of the non-drug programme [throwing out the baby with the bath-water] is simplistic and detracts from an understanding of the dynamics of compliance.

The HTDMC staff attended to all the patients' problems, developing considerable expertise especially in social counselling. Most urine and blood tests were performed at the point of care according to a protocol. Results of any tests that were performed outside the HTDMC were reviewed on receipt and where indicated patients were advised telephonically or by letter on what to do. A computerised data-base on patient attendance and disease control was up-dated daily and attendance defaulters were recalled within 3 days of missed appointments. Co-operation with specialist clinics was cultivated but not much used except for the departments of ophthalmology and dentistry and for a while the department of gynaecology - for cervical cancer screening.

Compliance with each component of the programme was systematically monitored at each visit and problems were constructively addressed. A structured record-sheet was used on which secular trends were easily noted [see appendix A for a later version of the record sheet]. HTDMC functioning was continuously evaluated and on two occasions formally studied.

Special arrangements were made with the administrative and pharmacy staff so that the HTDMC's patients would not be unduly delayed. When they were delayed the HTDMC staff interceded on their behalf. Within the HTDMC itself waiting time was used for group discussions and exercise classes. Morning and afternoon tea and nutritionally correct sandwiches were served to the patients. The staff shared these with the patients until the authorities put a stop to it, forcing each racial group and staff grade to attend separate facilities. Most patients enjoyed coming to the HTDMC. A clinic visit became for mant a friendly social outing. There was mutual trust and respect between the patients and the staff.

These considerations are important. When and where they did not apply, there was an observable negative effect on compliance and control. The HTDMC's non-drug treatment programme was enthusiastically accepted by the patients. Compliance with both attendance and the non-drug programme was observed to be good.

In an in-house study of 241 HTDMC female patients all of whom were domestic workers aged between 40 and 54 years and who had kept at least three consecutive post-admission appointments, the punctual [came on specified date] attendance rate over the next nine monthly visits was 73% among the 129 subjects who were not on drugs and 78% among the 112 drug-takers. There were 20% late-comers in the non-drug group; they attended on average 5.6 days late while 17% of the drug-takers came 3.3 days late. At no visit was there a statistically significant difference between the two groups. The peculiar South African socio-political characteristic of Black oscillatory urban/rural migration accounted for 19% of all non-punctual attendances. The drop-out rate, arbitrarily defined as not having attended by the time the study terminated, was 28% and 25% in the non-drug and drug group respectively.[11]

Because potassium intake increases natriuresis, urinary sodium cannot be used as a quantitative measure of compliance with a high potassium-low sodium dietary prescription. Urinary potassium values however do reflect potassium intake. The 24 hour urinary potassium excretion of 32 female HTDMC subjects on the prescribed diet was between 51 mmol/l and 62 mmol/l. When the usual HTDMC potassium supplement of 65 mmol/l per day was also taken the 24 hour urinary potassium level rose to 114 mmol/l [SEM 8] after 6 weeks.[6] These levels were significantly higher than the 31 mmol/l [SEM 1.5] found among 71 African black male normotensives from a similar community examined at about the same time.[12]

*The HTDMC's non-drug programme was relatively inexpensive.*

Constraints inherent in any treatment protocol undermine neither a community nor a personal non-drug approach but should limit the use of drugs to patients in whom non-drug measures on their own have after a fair trail demonstrably failed. The HTDMC protocol stipulated that if in the presence of good compliance and in the absence of inter-current blood pressure elevating events the blood pressure was above 160/95 mm Hg on 3 consecutive occasions, separated by an interval of 4 weeks, drug treatment should be started. When after the addition of a thiazide diuretic, the HTDMC's first step drug, blood pressure control was established and maintained for 3 months its use was interrupted or stopped.[13] If control had only been achieved with more drugs at higher doses, fewer items in lower doses were used.

*Side effects of treatment*

There are no negative side-effects with a personal non-drug programme, only positive spin-offs. Patients feel well with improved mental and physical functioning [table 2] and there is a decrease in overt disease [table 3]. Dependency on a medical-care facility is reduced.

Drug treatment on its own by contrast does not fit the bill. Drug side-effects and economic constraints both on the public supplier of drugs [state] and on the paying patient inhibit adequate compliance. Newer drugs with hopefully fewer clinical and biochemical side-effects than reported with thiazide diuretics and ß-blockers, are expensive. In 1987 it was noted that in the USA 20% - 35% of hypertensives found the cost of drugs prohibitive. [14]

Side-effects occur even in combination with non-drug strategies. In 1977 3 HTDMC patients on indapamide were admitted to hospital with muscle weakness and hypokalaemia. In one patient. the potassium level dropped from 4.6mmol/l to 2.3mmol/l in two weeks. In a subsequent review the average serum potassium values in 16 subjects on 2.5 mg indapamide for 2-13 weeks dropped from 4.4mmol/l [SD 0.4] to 3.4mmol/l [SD 0.5] and in 16 subjects on 50 mg hydrochlorothiazide the potassium values after 3-8 weeks dropped from 4.4 mmol/l [SD 0.5] to 3.6mmol/l [SD 0.4].[15] Indapamide was discontinued. The continued use 50 mg hydrochlorothiazide resulted in some subjects developing impaired glucose tolerance and diabetes, elevated serum uric acid levels and gout as well as

hypercholesteraemia. The dose was halved when evidence of the flat dose response curve became available.

When in 1985 very low serum potassium levels were recorded in a subset of severe hypertensives on sotalol, prazosin and a thazide-amiloride combination, the records of 160 HTDMC patients were reviewed [unpublished 1985]. All patients who had 2 sets of biochemical and clinical data, separated by an interval of 8 - 16 months with the latest reading within the previous 4 weeks were selected. All had complied with the HTDMC's potassium-supplemented low sodium - high potassium diet. None were on any drugs other than hypotensives and none were taking alcohol. All subjects on hypotensive agents had taken at least 80% of these in the 4 weeks preceding the blood sampling. The mean interval between the last meal and blood sampling was just under 4 hours [237 minutes; SEM 39.5] in subjects with a potassium level < 3.5 mmol/l and just more than 3.5 hours [214 minutes; SEM 21] in those whose potassium level exceeded 4.0 mmol/l. Their mean serum creatinine was 95umol/l [SEM 1.62].

Serum mean potassium levels fell in 33 subjects from 3.65 mmol/l [SEM 0.07] to 3.22 mmol/l [SEM 0.04]. The majority was female with severe hypertension, refractory to 2 or more drugs. Tracking in potassium levels was noted. There was a direct relationship between low potassium values and the use of vasodilators.

*The non-drug risk management programme at the HTDMC was effective*

The average blood pressure [9 monthly readings after admission] of the 129 female domestic workers in the study referred to above[11] who were not on hypotensive agents was 143/94 mm Hg. Seven months after admission fair control [=/<140/90 mm Hg] was achieved in 46% and approximated [140/90 - 160/95] in a further 13%.

Data on the first 798 patients admitted to the HTDMC over three years were reviewed.[16] New hypertensives [90%] with sustained hypertension and known hypertensives on drug treatment were studied. All study subjects had attended more than 3 times; females on average 16 times and males 13 times. The effectiveness of the total HTDMC programme [including the use of drugs] in controlling blood pressure and in reducing cardiovascular risk factors is shown in table 4.

In a comparative study in 1985 it was noted that the HTDMC used fewer drugs and lower doses for the management of hypertension than did two other out-patient clinics at the same hospital where a non-drug programme was not operative and where together a similar spectrum of hypertension was seen. Better blood pressure control was achieved among the HTDMC patients and possibly fewer HTDMC patients were admitted for in-patient care. It was not possible to compare the rate of hypertensive complications because these were not systematically looked for or recorded in the other two clinics [unpublished 1986].

*Conclusion*

To suggest that a non-drug programme for the control and risk management of hypertension is unacceptable to patients is possibly to be guilty of cynical pill-

pushing and a wish-fulfilling scepticism. Ignoring probable synergistic effects, if a small reduction in blood pressure [2-3 mm Hg] achieved by fair compliance with 1 personal non-drug intervention strategy is multiplied by the number of strategies, the clinical, logistic and economic impact of non-drug measures could be considerable.

Health promotion and disease prevention in the community are also important responsibilities of a non-drug hypertension risk-management programme and should not be neglected by health professionals. Even small reductions in blood pressure and in other risk factors for cardiovascular disease have, because of their high prevalence in the community, a large effect upon population health [4, 10].

In the 1980s it was possible to write that the success of doctor-independent, non-drug strategies in the community is evidenced by the reduction in weight of insured persons in the USA between 1959 and 1979 [Society of Actuaries, Build and Blood Pressure Studies]. Among informed and privileged groups an improved pattern of food consumption was noted; cigarette use was decreasing and everybody was jogging, soon to be replaced by aerobic exercise [gym].

The prevalence of hypertension and coronary heart disease mortality rates declined in Australia, Finland, the USA and elsewhere in the industrialised world from the 1960s until more recently. Rates were even down among white South Africans [1]. The individual management of hypertension and innovations in the treatment modalities of its complications could not be solely credited with this.

Unfortunately the underprivileged impoverished majority throughout the world is in contrast becoming increasingly exposed to the risk factors for hypertension and its complications, often through unscrupulous and uncontrolled market forces, aggravated in South Africa by the legacy of a repressive political climate and gross economic inequality. Similar macro-economic forces may account for the slowing down of the rate of decline in coronary heart disease and an increase in the prevalence of obesity and diabetes that occurred in the USA in the 1990s.[17]

Table 1 - *Personal non-drug measures and risk factors for hypertension and its complications*

| Personal non-drug measures | Site of action | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | HT | Complications of hypertension | | | | | | | | | | |
| | | Macrovascular | | | | | | | | Other | | |
| | | CIG | DLP | BMI | PIA | EUA | IGT | IPA | IBV | CCF | MHT | IRF |
| Eating a modified prudent or longevity diet | | | | | | | | | | | | |
| complex carbohydrates | + | | + | + | | | + | + | | | | |
| legumes at least 3 times per week | + | | + | | | | + | + | | | + | + |
| raw vegetables at least once daily | + | | + | + | | | + | | | | | |
| fish may be eaten daily | + | | + | | | | | + | | | + | + |
| vegetable oil as food dressing | + | | + | | | | | + | | | + | + |
| 3 or more glasses of water daily | | + | | | | + | | | | | | + |
| low-fat dairy products | + | | + | + | | | | | | | | |
| not more than 1 egg per week | | | + | | | | | | | | | |
| little or no meat | + | | + | + | | + | | | | | | + |
| little or no added sugars | + | | + | + | | | + | | | + | | |
| little or no added sodium | + | | | | | | + | | | + | | |
| no processed pre-cooked foods | + | | + | + | | | + | | | + | | |
| 5 or more small meals or snacks/day | + | + | + | + | | | + | | | | | |
| Cultivating healthy habits | | | | | | | | | | | | |
| no exposure to tobacco smoke | | + | + | | + | | | + | + | | + | + |
| little or no alcohol | + | + | + | + | | + | + | | | | | |
| regular physical exercise | + | + | + | + | + | | + | + | + | + | | |
| stress management strategies | + | + | | + | + | | + | | + | | | |
| Avoiding certain drugs | | | | | | | | | | | | |
| oral contraceptives | + | | + | + | | | + | + | + | | + | + |
| steroids | + | | + | + | | | + | + | + | | | |
| non-steroidal anti-inflammatory drugs | + | | | | | | | + | | | + | + |
| sympathethicomimetics | + | | + | | | | | | | | | |
| high doses of diuretics | | | + | | | + | + | | | | | |
| B-blockers without ISA | | | + | | + | | | | | + | | |

Key to abbreviations:

HT= hypertension, CIG = tobacco smoke, DLP = dyslipoproteinaemia, BMI = obesity, PIA physical inactivity, EUA = elevated uric acid, IGT = impaired glucose tolerance, IPA = increased platelet aggregation, IBV = increased blood viscosity, CCF = cardiac failure, MHT = malignant hypertension, IRF = impaired renal function

Table 2 - *Mental and physical functions and their determinants*

| **physiological function** | **determinants** |
|---|---|
| psycho-social behavior | drugs, alcohol, diet |
| respiratory function | tobacco, exercise, obesity |
| liver function | alcohol |
| GIT function | diet, alcohol, tobacco |
| sexual potency | drugs, alcohol, tobacco |
| reproductive efficiency | drugs, alcohol, tobacco |

Table 3 - *Diseases and their risk factors*

| **disease** | **risk factors** |
|---|---|
| constipation and piles | diet, exercise |
| hiatus hernia | diet, obesity |
| peptic ulcer syndrome | diet, alcohol |
| cirrhosis | alcohol |
| Ca colon and breast | diet, tobacco, obesity |
| cushinoid syndrome | alcohol |
| varicose veins | diet, obesity, exercise |
| musculo-skeletal distress | exercise, obesity |
| gout | drugs, diet, alcohol |
| morbid obesity | diet, exercise, alcohol |
| diabetes | drugs, diet, exercise, obesity, alcohol |

Table 4 - *The effect of treatment at the HTDMC*

| **risk factor** | **females** | | **males** | |
|---|---|---|---|---|
| *Reading/estimation* | *first* | *last* | *first* | *last* |
| systolic blood pressure (mm Hg) | 160 | 143 | 163 | 143 |
| diastolic blood pressure (mm Hg) | 102 | 91 | 106 | 94 |
| % deviation from mean body weight * | 28 | 22 | 8 | -2 |
| HDL cholesterol (mmol/l) | 1.29 | 1.36 | 1.16 | 1.33 |
| ratio: total cholesterol/HDL cholesterol | 4.5 | 4.2 | 4.8 | 3.9 |

* The Society of Actuaries. USA: 1959

## References


1 Derry CW, Bourne DE, Sayed AR et al. Variations in mortality in the coloured, white and Asian population groups in the RSA, 1978 - 1982: Part VI. Ischaemic heart disease. S Afr Med J 1987; 72:698-700.

2 Schnall Peter L and Kern Rochelle. Hypertension In American Society: An Introduction to Historical Materialist Epidemiology. In:Conrad Peter, Kern Rochelle,eds. The Sociology of Health and Illness. First Edition.New York:St Martin's Press,1981;73-89.

3 Beilin Lawrence J. State of The Art Lecture. Diet and Hypertension: Critical Concepts and Controversies. J Hypertension 1987; 5[suppl 5]:S447-S457.

4 Rossouw JE. Review Article. Diet and Heart Disease in the 1980s. S Afr Med J 1983; 64:437-442.

5 MacGregor Graham A. Sodium and Potassium Intake and Blood Pressure. Response to Hypertension Therapy Supp III Hypertension 1983; 5, 5:79-83

6 Matlou SM, Isles CG, Higgs A, Milne FJ, Murray GD, Schultz E, Starke IF. Potassium supplementation in blacks with mild to moderate essential hypertension. J Hypertension 1986; 4:61-64.

7 Editorial. Weight Reduction in Hypertension. Lancet 1985; 1251-1252.

8 Jooste PL, Langenhoven ML, Jordaan E et al. The relationship between alcohol consumption and coronary risk factors in the CORIS study. S Afr Med J 1987; 88:16-18.

9 Schultz E, Conway D, Matlou SM, Isles CG. The treatment of hypertension with magnesium chloride. Paper read at the fourth congress of the Southern African Hypertension Society 1985.

10 Rose G. Strategy of prevention: lessons learned from cardiovascular disease. Br Med J 1981; 282:1847-1851.

11 Schultz E and Tzikane J. Pattern of Attendance at the Hypertension Clinic at the Hillbrow Hospital Johannesburg. Paper read at the third congress of the Southern African Hypertension Society 1983.

12 Barlow RJ, Connell MA, Levendig BJ, Gear JSS, Milne FJ. A comparative study of urinary sodium and potassium excretion in normotensive urban Black and White South African males. S Afr Med J 1982; 62:939-941.

13 Stamler R, Stamler J, Grimm R et al. Nutritional therapy for high blood pressure; the final report of a four-year randomised control trial - the Hypertension Control Program. JAMA 1987; 257:1484-1491.

14 Moser M. Ann. Int. Med. 1987; 107[1]:107-108.

15 Schultz, E.L. & Seftel, H.C. Hypokalaemia in hypertensive Blacks treated with diuretics [letter]. S Afr Med J 1978; 53: 349.

16 Schultz E. The effectiveness of the Hypertension Clinic at the Hillbrow Hospital Johannesburg in controlling hypertension and reducing cardiovascular risk factors. A review of the first three years. Paper read at the second congress of the Southern African Hypertension Society 1981.

17 CDC. Mortality from coronary heart disease and acute myocardial infarction — United States, 1998. MMWR 2001; 50:90-93